ESA-013-3 – Guardian Automotive Trim – Final Public Report

Company	Guardian Automotive Trim, Inc.	**ESA Dates**	3/4/08 – 3/6/08
Plant	Evansville, IN	**ESA Type**	Compressed Air
Product	Automotive Trim	**ESA Specialist**	Kyle Harris

IDENTIFIED PLANT BEST PRACTICES	
#1	LP blowers used in many applications versus compressed air
#2	Many past compressed air efficiency measures have been implemented
#3	High efficiency blow guns in use
#4	Desire among plant personnel to identify waste and improve processes
#5	Leak maintenance well maintained / Leak load low

Introduction:

Guardian Industries is one of the world's largest manufacturers of float glass and fabricated glass products as well as a manufacture and supplier to the automotive industry with a variety of exterior products. Guardian has also become a significant player in the building materials distribution business and has become the world's largest producer of mirrors. Headquartered in Auburn Hills, Michigan, the privately held Guardian Industries group of companies has over 19,000 employees worldwide.

The United States Department of Energy (DOE) “Save Energy Now” program completed an Energy Savings Assessment (ESA) March 4, 2008 at the Guardian Automotive Inc. facility in Evansville, Indiana. The DOE Qualified Specialist/Energy Expert conducting the compressed air system ESA was Kyle Harris of Accurate Air Engineering, Inc., Bakersfield, California.

The Guardian Automotive, Evansville compressed air system includes five air compressors serving a number of different production end uses. The air compressors vary in size from 150 horsepower to 300 horsepower. The compressed air supply system consists of one 300 hp centrifugal air compressor, one 200 hp centrifugal air compressor, two 200 hp 2-stage oil-free rotary screw air compressors and one 150 hp 2-stage oil-free rotary-screw air compressor. The plant uses compressed air on a 52 week per year, 7 days a week, 24 hours per day schedule. Currently, the compressed air system average air flow is 3,000 cfm, uses over 4,300,000 kWh/year and accounts for over 8% of the total plant electricity consumption.

Objective of ESA:

Identify compressed air system improvement recommendations, train plant personnel how to correctly model the current system and predict potential savings using the DOE AIRMaster+ software tool.

Focus of Assessment:

Compressed air supply, distribution and end uses.

Approach for ESA:

Compressor amp data was collected on all of the air compressors for one week prior to the ESA as well as one pressure point on the distribution header. Together, the DOE ESA Expert and plant personnel used LogTool V2 to interpret the data and format the data for direct import into AIRMaster+. Compressor profiles were developed and a baseline compressed air profile was created within AIRMaster+.

A survey of the compressed air supply and demand was completed. As part of the "training assessment" the plant personnel, with direction from the DOE ESA Expert, created a number of energy efficient measures to evaluate the impacts of each measure. Ultimately, these measures were prioritized in order to achieve the best effect of the improvements. A closeout meeting was conducted to present the findings to a number of plant personnel that may be affected by the proposed improvements.

General Observations of Potential Opportunities:

The following section briefly discusses the projects identified for additional investigation or implementation. A qualifier is assigned to each project – *near-term, medium-term* or *long-term.* These descriptors are identified as follows:

- *Near-term* opportunities would include actions that could be taken as improvements in operating practices, maintenance of equipment or relatively low cost actions or equipment purchases.
- *Medium-term* opportunities would require purchase of additional equipment and/or changes in the system. It would be necessary to carryout further engineering and return on investment analysis.
- *Long-term* opportunities would require testing of new technology and confirmation of performance of these technologies under the plant operating conditions with economic justification to meet the corporate investment criteria.

Near-Term Opportunities

- Replace Rental Air Dryer

  Currently, two heatless regenerative air dryers are rented and temporarily installed to dry the air from the two centrifugal air compressors. Though there are plans to replace the air dryers with a single, permanent refrigerated air dryer, the delay in purchase is costing the plant at least $12,000 annually. The new air dryer should be purchased and installed as soon as possible saving an average of 175 cfm currently used for purge air.

- Replace Open-Blowing In Paint Pit

  The Evansville plant must be commended for its efforts to use low pressure blowers in applications where compressed air is normally inefficiently used in industry. However, there is at least one application in the plant where compressed air is used to agitate water below a paint pit. A compressed air hose is connected to the plant air header and is blown through two lances. This application should be removed or replaced with a low pressure blower. It is estimated that over 18,000 kWh or $1,200 annually could be saved.

Medium-Term Opportunities

- Automate Air Compressors

  During the ESA spot checks, data collection and subsequent modeling in AIRMaster+, there are periods of time where one centrifugal may run in part load or inefficiently. Once demand side improvements are made (i.e., reduction in demand) it is possible, if not guaranteed, that the two centrifugal air compressors will operate partially loaded. It is recommended that the air compressors be automated so that the 300 hp air compressor is 100% loaded ("base compressor") with one or two 200 hp rotary screw air compressors loading and unloading ("trim compressors"). The automation should start the 200 hp centrifugal ("base compressor") when both of the trim compressors are fully loaded, the existing intermediate control is 100% open and the pressure is falling. The Trim compressors will respond by loading, unloading and then stopping in their fixed sequence. The existing intermediate controller can be set at its current set point of 100 psig, with a recommended future set point of less than 95 psig. All current assets can be used.

  It is estimated that 317,000 kWh to 731,000 or $19,000 to $44,000 annually could be saved with a payback ranging from 1.4 years to 3.1 years depending on the final arrangement and order of implementation.

- Shut Off Department 22 Guns When Not In Use

  Currently, the spray guns in Department 22 always use compressed air. After the paint process is complete, the spray gun continues to use compressed air. It is possible to retrofit the Department 22 stations so that the spray gun air is turned off when the product is not being painted. It is estimated that over 112,000 kWh or

$7,000 annually could be saved with a payback ranging from 1.0 to 7.0 years depending on the final arrangement. Initial estimates indicate the simple ROI may be high for this measure, but Guardian should obtain firm quotes to establish the payback for this measure.

- Reduce Air Leaks

  It is conservatively estimated that a least 150 cfm of air leaks exist at the plant. Though not tested, this figure is well below the average for an industrial plant this size and should be used as an example of what impact correcting 50% of the leaks, or 75 cfm, would have on this facility. Additional testing would most likely expose additional leak load and thereby create more opportunities for savings. It is estimated that a minimum of 103,728 kWh or $6,200 annually could be saved by repairing the 75 cfm leak load.

Long-Term Opportunities

- Replace "Paint Kitchen" Pneumatic Mixers With Electric

  By far the largest single compressed air using area in the plant, the "Paint Kitchen" area also presents the largest single opportunity for compressed air savings. There are a number of pneumatic mixers as well as pneumatic pumps. The pneumatic mixers generate approximately ½ shaft horsepower and use 20 cfm of compressor capacity each or approximately 4.5 kW of compressor room capacity for each mixer. Though explosion proof motors as well as an intrinsically safe installation may be expensive, the annually savings may justify replacing all of the pneumatic mixers with electric mixers.

  It is estimated that an average 600 cfm, over 820,000 kWh or near $50,000 annually could be saved with a payback ranging from less than 1.0 year to 3.0 years depending on the final arrangement, order of measure implementation and final project costs.

Other Opportunities

- Instrumentation
  Currently, there is little to no instrumentation on the plant compressed air system. The ESA used one week's worth of amp data, one pressure point and whatever other information was available while on site (i.e. spot checks of centrifugal inlet and blowoff valve positions). Additional information is required to validate the baseline and move forward with some measures. At a minimum, each centrifugal air compressor should have a dedicated flow meter and kW transducers installed and connected to a central data collection point. Pressure transmitters would also be beneficial.

Management Support and Comments:

Guardian Automotive is dedicated to reducing energy consumption throughout the plant. The site lead, Angie Scheller and team members, Steve Rippy and Scott Boone provided full support before and during the ESA. They are part of the "Energy Team" at the Evansville plant and are dedicated to improve the compressed air system efficiency.

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